Image Awareness Wellness Institute

The Cell Part 4:The Brain of the Cell

1271 High Street, Auburn, CA 95603 • Phone (530) 823-7092 • order line (800) 359-6091
Hours: Tues. – Fri. 10 a.m. – 4 p.m. • E-mail: mail@imageawareness.com web: www.ImageAwareness.com

February 2013 **Volume 9: Issue 2**

Introduction

The nucleus of the cell with its remarkable accumulation of blueprints for life and the mitochondria with their awesome ability to generate power are awe inspiring structures. Here we shall look at what many consider the most critical structures of the cell, bounding membranes.

We have already noted that both the nucleus and the mitochondria have bounding membranes. These membranes perform critical functions. Here we shall focus on the outer membrane of the cell which allows it to interface with the rest of the world.

Bruce Lipton, a former medical school professor and researcher wrote, "I believe that when you understand how the chemical and physical structure of the cell's membrane works, you'll start calling it, as I do, the magical membrane." Lipton refers to it in his lectures as the magical "mem-Brain" because the cell's membrane must have discretionary ability in order to function properly.

Lipton believes that the DNA and the nucleus are only the gonads or reproductive machinery of the cell. He notes that one can remove the nucleus of a cell and it will go on functioning. By contrast, the cell will die immediately if the membrane is damaged "just as you would if your brain were removed."

References:

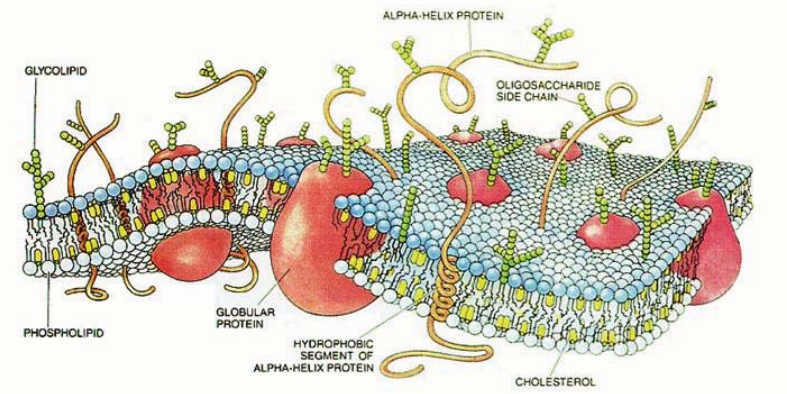
Lipton, Bruce, *The Biology of Belief*, Santa Rosa, CA: Elite Books, 2005, 75, 86.

Cell diagram by Dana Burns in Bretscher, M.S., The molecules of the cell membrane, *Scientific American*, 1985; 253(4):86-90. https://commons.wikimedia.org/wiki/File:CellMembraneDrawing.jpg

Membrane Structure

The membrane of the cell separates the interior of all cells from the outside environment. The structure is composed of what is called a lipid bilayer with embeded proteins.

The lipid bilayer consists of phosphorus containing lipids or fats with a head and two tails. The two parts of these lipids have a split personality. Lipton refers to them as schizophrenic.



The head of a membrane lipid loves water and seeks it out while the tails try to avoid water. Imagine olive oil and vinegar combined into one molecule. It is impossible to get the two to combine even with vigorous shaking. The fat loving olive oil wants to be with other fats, while the water loving vinegar wants to be with other water soluble vinegar.

The schizophrenic phospholipid molecules that make up a cell membrane set up a powerful dynamic when they get together. The tails all move to the center of the double-layered lipid membrane. The heads face toward the center of the cell and toward the exterior of the cell.

The lipids do not let positively or negatively charged molecules pass through. This poses a problem because many of the nutrients upon which the cell depends to sustain life have molecular charges. In addition, waste products must be eliminated, and many of these waste products have molecular charges.

Proteins are embeded into the cell membrane. These are called Integral Membrane Proteins (IMPs). Embeding of protein into the membrane is possible because protein chains have parts which have molecular charges and other parts which do not have

charges. The proteins weave themselves through the lipid membrane linking to the most appropriate molecular charges in the lipid membrane.

The proteins embeded into the cell membrane are of two types. The first consists of *receptor proteins*. Receptor proteins monitor what is going on within the cell and what is going on outside the cell. These proteins are like switches that can be turned on and off. Receptor proteins can respond to hormones like estrogen and insulin as well as responding to vibrational energy like light and sound. They can be considered as having a similarity to our sense organs such as hearing, sight and touch.

A second type of protein in the lipid membrane is the *effector protein*. These proteins allow the cell to respond to the signals picked up by the receptor proteins. They might be likened to our muscles, hands and feet.

The stimulus-response teamwork of these two classes of proteins has resulted in a whole new field of scientific inquiry called *signal transduction*, the study of the way Integral Membrane Proteins work. Lipton wrote, "The study of signal transduction is catapulting the membrane to center stage, just as the field of epigenetics is high-lighting the role of the chromosome's proteins."

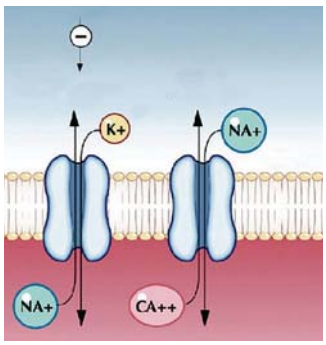
The cell membrane's effector proteins respond to environmental signals. They in turn control the "reading" of the genes so the body can make new proteins or replace worn out proteins. In this manner the balance of lipids and proteins in the cell membrane is a primary determinative factor in how the genes and DNA function.

One of the most important types of effector proteins is involved in opening up channels through the cell membrane to allow nutrients in and waste products out. Not only the lipids and proteins play an important role in the functioning of these channels, but vitamins and minerals also play a critical role.

Perhaps you have heard of medications that are calcium channel blockers. These medications are used to lower blood pressure and decrease muscle contractility. Calcium opens up the calcium channel causing blood pressure to rise and muscles to contract. Magnesium is nature's natural calcium channel blocker and works in a manner similar to the medications.

Magnesium, vitamin B6 and zinc have been shown to play a role in closing these ion channels. Calcium and glutamate act to open ion channels. This is why excessive calcium intake, apart from magnesium intake, can cause muscle cramping. It also explains why excessive intake of monosodium glutamate (MSG) can cause flushing and headaches in some people as it opens ion channels. Magnesium, glycine and vitamin B6 have been shown to block the harmful effects of exessive intake of monosodium glutamate. They shut the door on the ion channels. Excessive exposure of brain cells to glutamate can kill the cells which is why one author refers to MSG as an excitotoxin. It so excites the brain cells it can kill them. One can immediately see that a balanced nutritional intake is required to stabilize the functioning of the membrane proteins.

To put it very simply, the primary function of the lipids and sterols is the composition of membranes. These membranes composed of lipids and sterols and interwoven with proteins act as the stimulus-response



apparatus for the cells and for cell organelles such as the mitochondria. All this takes place at the cellular and subcellular level. Optimal functioning of cell membranes is dependent upon proper structure. It is well-known that if optimal construction materials are missing from the diet the body will substitute inferior building materials into cell structure leading to inferior and faulty functioning. Deficiency of essential fatty acids is reflected in blood tests by synthesis of unusual fats (palmitoleic and mead acids) to serve as substitutes for normally occuring fatty acids. Fatty acid substitution is accompanied by a range of degenerative conditions including fatty liver, accelerated aging, nerve degeneration, arthritis, cancer, weakness and immune dysfunction to name a few.

References:

Lipton, Bruce, *The Biology of Belief*, Santa Rosa, CA: Elite Books, 2005, 82-87.

Blaylock, Russell L., *Excitotoxins The Taste that Kills*, Santa Fe, New Mexico: Health Press, 1995, 28.

Possible vitamin B6 deficiency uncovered in persons with the Chinese Restaurant Syndrome, *Nutrition Reviews*, January 1982, 40(1): 15-16.

Lord, Richard S., and Bralley, J. Alexander, *Laboratory Evaluations for Integrative and Functional Medicine*, 2nd Edition, Deluth, GA.: Metametrix Institute, 2008, 293-294.

Membrane Lipids

It is difficult to overestimate the importance of the cell membrane. The health of every cell in the body is tied to the health of its membrane. The health of each and every cell is tied to the health of the body as a whole.

There are three major types of lipids which inhabit the membrane of cells. These are *phospholipids* (lipids which contain phosphorus), *glycolipids* (lipids bound to sugar molecules), and *cholesterol*. The fats providing optimal building materials for human cells are found in both plant and animal sources.

Plants, particularly cereal grains, legumes, and nuts provide an impor-

tant source of quality lipids and sterols from both the omega-3 and omega-6 categories. Much attention has recently focused on plant sterols and their ability to inhibit cancer development due to the manner in which they modify signal transduction

Fish and grass fed animals can provide an important accessory source of omega-3 fatty acids. The omega-3 fatty acids found in fish have proven important in regulation of inflammatory responses at the cellular level.

Phospholipids

An everyday example of a phospholipid is lecithin found in egg yolk and soybeans. The phospholipids consist of a head group with two tails which are typically unsaturated fats. Phospholipids are the key to the construction of the bilipid membranes found in cells. This complex structure is impossible without phospholipids.

The phospholipid tails will consist of whatever types of fats are available in the diet. Higher quality unsaturated fats increase the fluidity of the cell membrane, while more saturated fats decrease the fluidity of the cell membrane.

Membrane fluidity plays a key role in a number of important cellular functions such as the movement of red blood cells through capillaries which are much smaller than they are. Kane points out that fluidity of the cell membrane is synomymous with life since red blood cells must flow through many capillaries half their own size. Failure here leads to oxygen starvation of the tissues and oxygen is essential for energy production in the mitochondria.

Fluidity plays a role in the reproductive activity (replication) of white blood cells in immune defense and in chemotaxis–the movement of the white blood cell defenders of the body to the site of a wound or an infection.

A highly fluid cell membrane can "kick off" an accumulation of oxidized cholesterol and will resist its incorporation into the membrane. Unhealthy membranes lose their fluidity and the membrane structure can become grossly distorted leading to abnormality of function.

Phospholipids should be composed of highly unsaturated fats. The body counterbalances the fluidity they provide by inserting cholesterol into the cell membrane to decrease fluidity as needed.

REFERENCES:

https://en.wikipedia.org/wiki/Membrane_lipids

Kane, Patricia C., et al., *The Detoxx Book, 2007 Edition*, Haverford, PA: Haverford Wellness Center, 2007, 16-17, 48.

Cholesterol

Cell membranes typically consist of 20% cholesterol. Cholesterol concentrates with glycolipids in areas of the cell membrane where lipid rafts form. The lipid raft areas of the cell membrane are where the proteins attach or penetrate the cell wall.

Cholesterol is an essential building block of healthy cells. Research has shown that the association of heart disease to cholesterol resulted primarily from feeding animals oxidized cholesterol which is 500 times more atherogenic than non-oxidized cholesterol. Oxidized cholesterol is not only unhealthy for the heart, but it is also undesirable at the cellular level. Oxidized cholesterol can destabilize the lipid membrane of the cell.

Glycolipids

The glycolipids are lipids with attached carbohydrates. These lipids are generally found on the exterior surface of the cell. They play a role in allowing cells to join with one another to form tissues. They also serve as surface markers the immune system uses to identify a cell as belonging to the body as opposed to being an enemy which should be attacked. Failure of recognition of cells as being part of the self leads to autoimmune disease where the immune system attacks its own tissues. Deterioration of glycolipid structure is involved in cancer development and growth.

REFERENCE:

Hakomori, Sen-itiroh, Aberrant glycosylation in cancer cell membranes as focused on glycolipids: Overview and perspectives, *Cancer Research*, June 1985; 45: 2405-2414.

Detoxification

Many researchers feel that the phospholipids in the cell wall play a key role in maintaining the overall health of the cell and allowing the cell to detoxify.

Many of the most dangerous toxins in man's modern environment consist of what are called lipophyllic toxicants. This means that they literally love fat. They have a particular affinity for fatty deposits in the body and also for cell membranes which are composed primarily of fats.

The individual with a large accumulation of toxins stored in their body fat will tend to become ill when they miss meals or go on a fast. These toxins are released and enter the blood stream when abstaining from food.

Toxins stored in cell membranes interfere with the normal functioning of channels in cell membranes which regulate many activities of the cells (sodium and calcium channels). They also disrupt the production of energy in the mitochondria. Fat loving toxins also disturb the normal functioning of the cell membrane by altering fluidity, altering the release of inflammatory chemicals from the cell membrane, and disturbing the stability of the cell membrane structure itself.

Examples of lipophyllic toxins include heavy metals, pesticides and herbicides, petrochemicals, and neurotoxic molds. The most lipid rich tissues in the human body are the brain and nerves. It should not be surprising that accumulation of fat-loving toxins will tend to have profound effects upon thought and emotions as well as

IMAGE AWARENESS
WELLNESS INSTITUTE
1271 HIGH STREET, AUBURN, CA 95603
PHONE (530) 823-7092 ORDER LINE (800) 359-6091
E-MAIL: MAIL@IMAGEAWARENESS.COM
VISIT OUR WEBSITE! WWW.IMAGEAWARENESS.COM

contributing to nerve damage as seen in neuropathy. The modern epidemic of psychological complaints such as depression, anxiety, and attention deficit probably owes more to toxin exposure that it does to any other factor except faulty nutrition.

REFERENCE:

https://en.wikipedia.org/wiki/Membrane_lipids

Kane, Patricia C., et al., *The Detoxx Book, 2007 Edition*, Haverford, PA: Haverford Wellness Center, 2007, 10, 3.

Restoring Healthy Membrane Function

One research group observes, "The lipid membrane through its fluid motion controls all activity that occurs in the body. It is the heart of the health of the cell and is crucial in addressing the systemic health of the patient."

John Foster, M.D., writes, "I am of the belief that it is all lipids, that no aspect of our physiology is more important nor under greater attack in the modern world than our lipids. In our work with neurodegenerative diseases it is staggering how the correction of lipid dysfunction and the addition of proper fats can stabilize the progression and sometimes dramatically reverse the symptoms of illness even when they have been long-standing."

Patricia Kane and associates believe that healing the cell membrane is the highest priority in addressing chronic illness. The group seeks to establish a 4:1 balance between high quality omega-6 and omega-3 fatty acids.

Nutritional support for healthy membrane structure involves incorporating into the diet quality sources of phospholipids and omega-3 fatty acids. Supplementation with an omega-3 supplement like GNLD Salmon Oil Plus screened for hundreds of toxins with a standard of none detectable can go a long way in reducing the toxin load in the body. High quality fats can be avidly taken up by cell membranes displacing contaminated fats.

REFERENCE:

Kane, Patricia C., et al., *The Detoxx Book, 2007 Edition*, Haverford, PA: Haverford Wellness Center, 2007, 10, 3, 18-19.

Anti-Microbial

We take it for granted that soaps have anti-microbial activity. It is little realized, however, that most soaps are rich in fatty acids. Fatty acids have antiviral, antibacterial, and antifungal activity at the level of the cell membrane. They also can prevent penetration of cells by viruses.

REFERENCE:

Kabara, Jon J., Fatty acids and derivatives as antimicrobial agents-A review, in *The Pharmacological Effect of Lipids*, Edited by Kabara, Jon J., Champaign, Illinois: The American Oil Chemsts' Society, 1978, 1.

Web Resources

www.imageawareness.com

www.yourbodyssignlanguage.com

www.jimmcafee.com

Disclaimer

This publication contains the opinions and ideas of its author. It is intended to provide helpful and informative material on the subjects addressed in the publication. It is provided with the understanding that the author and publisher are not engaged in rendering medical, health, or any other kind of personal professional services in this newsletter. The reader should consult his or her medical, health or other competent professional before adopting any of the suggestions in this newsletter or drawing inferences from it.

The author and publisher specifically disclaim all responsibility for any liability, loss, or risk, personal or otherwise, which is incurred as a consequence, directly or indirectly, of use and application of any of the contents of this newsletter.